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Antenatal Caregiving Representations and Perinatal Behavior in Mothers with Severe Lifetime Psychopathology

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Compliance with Ethical Standards

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Ethical approval: The WARM study has been approved by The committees of Health Research Ethics in the Capital Region of Denmark (Protocol no: H-2-014-024) and by the West of Scotland Research Ethics Service and the NHS GG&C Board Approval (REC Reference 14/WS/1051) in accordance with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: Informed consent was obtained from all individual participants included in the study before assessments took place.

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Abstract

Psychopathology poses a risk for parenting. This study aimed to explore antenatal caregiving representation as additional markers for later risk of non-optimal maternal behavior among mothers with severe mental illness related to psychosis.

Sixty-five mothers diagnosed with psychosis, bipolar disorder, depression, and non-clinical controls participated in a longitudinal study from pregnancy to 16 weeks after birth. Mental health diagnoses and caregiving representations were assessed during pregnancy. Maternal behavior was assessed during the five-minute recovery phase of the Still Face paradigm at 16 weeks.

Mothers with psychopathology showed significantly higher levels of ‘heightened’ caregiving representations (i.e., separation anxiety from the child) than controls. The only significant diagnostic group difference in perinatal maternal behavior was found for mothers diagnosed with depression compared to non-clinical controls, with depressive mothers exhibiting more intrusive behavior. Antenatal caregiving representations of ‘role reversal’ predicted lower levels of sensitivity and higher levels of intrusiveness independent of the effect of psychopathology.

The findings are interpreted in the context of representational transformation to motherhood during pregnancy. The results provide preliminary evidence for the potential of a new measure of caregiving representations as a screening instrument for antenatal representational risk.

Keywords: antenatal caregiving representation; perinatal maternal behavior; psychopathology; psychosis, depression

Severe maternal psychopathology affects parenting behavior and places children at risk for poor developmental outcomes (Oyserman, Mowbray, Meares, & Firminger, 2000). There is substantial evidence that a diagnosis of depression is associated with non-optimal maternal behavior, including during remission phases (Lovejoy, Graczyk, O'Hare, & Neuman, 2000). A recent systematic review concluded that mothers diagnosed with schizophrenia showed impaired parental behavior during the first 12 months compared to non-clinical controls (Davidsen, Harder, MacBeth, Lundy, & Gumley, 2015). Research on maternal behavior among mothers with bipolar disorder is sparse; the few studies conducted find that bipolar depressed mothers are *more* likely to vocalize and engage in positive interactions with their children compared to unipolar depressed mothers (Goodman & Liu, 2014). However, children of mothers with bipolar disorder are still more likely to have insecure attachments with their mother than children of mothers with unipolar depression (Radke-Yarrow, Cummings, Kuczynski, & Chapman, 1985), suggesting that bipolar disorder poses a risk factor for maternal behavior and child development.

Severe mental illness (SMI) is by nature episodic (Oyserman et al., 2000). Thus, children of mothers with a lifetime history of SMI are likely to be parented both during active and remission phases of psychopathology. Epidemiological research has demonstrated that more than half of women with severe psychopathology (e.g., schizophrenia, bipolar disorder and other psychotic disorders) become mothers and no clinical differences have been found between those that become mothers compared to those that do not (Howard, Kumar, & Thornicroft, 2001). Most parenting studies of mothers with SMI are cross-sectional and based on samples recruited from inpatient facilities (mother-baby units) (Davidsen et al., 2015). Therefore, most research on the impact of SMI on maternal behavior is based on observations during periods of active symptoms. Less is known about how a lifetime history

of SMI affects parental behavior during remission phases. Oyserman et al. (2000) suggest that persistent emotional and relational difficulties among mothers with SMI are important in understanding impairments in motherhood. Antenatal caregiving representational development could be one important parental domain affected by psychopathology and potentially allow early detection of mothers at risk of non-optimal caregiving behavior.

Caregiving Representations

Five decades of research has demonstrated that transformations during pregnancy prepares women for motherhood (Slade, Cohen, Sander, & Miller, 2011). This process involves maternal representations of becoming a parent that develop from emotional engagement with the fetus (maternal-fetal relationship) and expectations for the future relationship with the child. Both concepts have been suggested to be part of the caregiving system (Walsh, 2010). Following attachment theory, George and Solomon (2008) theorized that all parents transform their internal representation from *seeking protection* (the goal of their attachment system) to *providing comfort and care* for their child (the goal of their caregiving system) in order to become the “stronger and wiser” member of the attachment-caregiving relationship. Further, these authors demonstrated that mothers of children with disorganized attachment have caregiving representations characterized by helplessness or role reversal, conceived as high-risk representations of maternal abdication of care and failed protection.

Antenatal assessment of maternal representations predicts observed and mother-reported maternal behavior as well as infant attachment at 12 months (Crawford & Benoit, 2009; Dayton, Levendosky, Davidson, & Bogat, 2010; Siddiqui & Hägglöf, 2000; van den Bergh & Simons, 2009). A meta-analysis concluded that depression is a significant predictor

of maternal-fetal relationship (Yarcheski, Mahon, Yarcheski, Hanks, & Cannella, 2009). The only study involving clinically depressed mothers found lower intensities of the maternal-fetal relationship among depressed women compared to non-depressed women (McFarland et al., 2011). Knowledge about the impact of psychosis and bipolar disorder on caregiving representations is sparse and perinatal research involving clinical groups is needed.

Furthermore, assessment of antenatal caregiving representations to date has relied on the use of time-consuming maternal interviews that limit the practical usefulness of these instruments in larger samples and clinical practice. Early screening of mothers could be important in identifying mothers in need of interventions.

Aim and Hypothesis

The present study aim to explore associations between psychopathology, antenatal caregiving representations, and maternal perinatal behavior in interactions with the infant at 16 weeks in a sample of mothers with severe mental disorders and their non-clinical controls. We expect women with psychopathology to report more non-optimal antenatal caregiving representations and show less sensitivity and more overriding maternal behavior in interactions with their infant compared to non-clinical women. In addition to the effect of psychopathology on maternal behavior, we expect antenatal caregiving representations to be predictive of maternal behavior and will explore mediation models if assumptions are meet. As prior research on caregiving representations and perinatal behavior among women with psychosis and bipolar disorder are sparse, we have no specific hypothesis regarding differences between diagnostic groups. These analyses are thus exploratory.

Method

The current study

Data were drawn from an ongoing prospective, longitudinal Danish-Scottish cohort (WARM, Wellbeing And Resilience study examining Mechanisms of transmission of health and risk in parents with complex mental health problems and their offspring). The WARM Study was setup to explore early risk and resilience factors among infants of mothers with psychosis-related mental disorders (Harder et al., 2015). Ethical approval to the WARM study came from Health Research Ethics, Capital Region of Denmark (Protocol no: H-2-014-024) and the West of Scotland Research Ethics Service (REC Reference 14/WS/1051). Data to the current study was collected in Denmark and Scotland between October 2014 and November 2016.

Participants were Danish or Scottish pregnant women and their infants. Inclusion criteria were a) a DSM-5 diagnosis of Delusional Disorder, Schizophreniform Disorder, Schizophrenia or Schizoaffective Disorder, Psychosis NOS, Brief Psychotic Disorder, or b) a DSM-5 diagnosis of Bipolar I and II Disorder, or c) a DSM-5 diagnosis of Major Depressive Disorder (current moderate or severe episode or lifetime recurrent moderate or severe), or d) a non-psychiatric control group defined as mothers without any history of treatment or admission for a psychiatric disorder or drug or alcohol addiction. Maternal exclusion criteria for the current study were: a) mother unable to speak English or Danish, b) miscarriage, c) diagnosis of Autistic Spectrum Disorder, and d) unable to provide informed and written consent for their own and their unborn child's participation in the study. Infant exclusion criteria were: a) infants born with a congenital developmental disorder, which can be diagnosed from birth, such as for example Down's Syndrome; or b) miscarriage

after antenatal assessments were completed. Participants were recruited through obstetric wards in Capital Region of Denmark, Region of Southern Denmark, and Region Zealand, and in Scotland through perinatal mental health services and midwifery in NHS Greater Glasgow and Clyde through a non-selective procedure (see Harder et al., 2015 for further information). Seventy participants consented to participate in the study. Five participants dropped out before antenatal data collection had finished and were not included in the present study (flow of participants presented in Figure 1).

Insert Figure 1 here

Following the WARM study protocol, maternal psychopathology was assessed after obtaining written informed consent from all participants to confirm inclusion diagnosis. Assessment of caregiving representations was part of a small battery of questionnaires assessed at a subsequent scheduled meeting. Most assessments of maternal psychopathology took place at the beginning of the third trimester ($M = 30.1$ GA weeks; $SD = 6.4$; range: 14.9-38.3). On average, assessments of antenatal caregiving representations took place one week later ($M = 31.1$ GA weeks; $SD = 7.3$; range = 13.9-38.9). All antenatal assessments were conducted during home-visits or at the obstetric ward according to the mother's preference. Mother-infant interaction was assessed at 16 weeks of infant age during home-visits. Other assessments of mother and infant, not included in this study, was carried out during pregnancy and at postnatal assessment points (for more information on the WARM study and other assessments see Harder et al., 2015).

Measures

Maternal psychopathology. Psychiatric diagnoses were assessed using the psychosis and mood modules of the Structured Clinical Interview for DSM-5 (First,

Williams, Karg, & Spitzer, 2016) to confirm inclusion diagnosis. All diagnostic assessments were supervised by a researcher trained on the SCID (AA) and all diagnoses were discussed and confirmed through consensus discussion among the senior researchers (BB, CC, DD, EE).

General level of symptom severity was assessed during pregnancy using the symptom scale of The Global Assessment of Functioning (GAF; American Psychiatric Association, 2013). The GAF is a numeric scale (0 through 100). Reliability obtained on 15 % of the sample was $ICC(1) = 0.602$.

Caregiving representations. Antenatal caregiving representations were assessed using the Prenatal Caregiving Experience Questionnaire (PCEQ, unpublished instrument, Brennan & George, 2013), a 40-item self-report measure assessing pregnant women's expectations about their future relationship with their child. Responses are given on a 5-point Likert scale. The PCEQ was translated into Danish by two independent researchers and back translated by a bilingual English-Danish speaking Associate Professor in Psychology. Any translational divergences compared to the original version were resolved by discussion with and guidance from the PCEQ co-authors (XX, YY). A cross-cultural validated four-factor model of the postnatal version of the questionnaire (CEQ Age 1.5-5) was used in the current study (Røhder et al., in press). There are four subscales: *Enjoyment*, mothers expect positive feelings about the child ($\alpha = .709$; e.g. "My baby will be worth all the love and attention I can give him or her"); *heightened*, mothers expect difficulties in separating from their child ($\alpha = .758$; e.g. "I think that I will be lonely when my baby and I are separated"); *helplessness*, mothers expect their child to be out of control and themselves as unable to take care of child ($\alpha = .801$; e.g. "Sometimes I may just lose it and scream at him or her or punish too harshly"); and *role reversal*; mothers expect the child to understand

and cheer up the mother ($\alpha = .672$; e.g. *“My baby and I will be really close. I will be able to just sit there and tell him or her if I had a bad day and s/he will understand”*). To our knowledge the PCEQ is the only existing time-efficient, multi-dimensional measure of antenatal caregiving representations. Cross-sectional studies with the PCEQ support the multi-dimensional structure of the measure as well as construct validity in relation to maternal-fetal attachment, social support, and adverse childhood experiences (Brennan, 2017; Røhder et al., accepted for publication).

Maternal behavior. Maternal behavior was assessed during the recovery phase of a 10-minute interaction based on the Still-face paradigm. The infant was placed in an infant chair with the mother placed in front of her infant. Two cameras facing mother (face and shoulders) and infant (full body and face) was used. Coding was based on split-screen recordings displaying both mother and infant. The mother was asked to first play with her infant for three minutes (engagement phase) and then hold a still face (freezing, not displaying emotions, or touching the infant) for two minutes (still face phase). The five-minute recovery phase was coded using the Coding Interactive Behavior manual (CIB, unpublished manual, Feldman 1998). The decision to score maternal behavior during the recovery phase was based on prior research on the caregiving system (Lyons-Ruth, Bronfman, & Parsons, 1999; Solomon & George, 1996) suggesting that the mother’s caregiving system is activated in situations where the infant’s attachment system is activated and thus best observed in distressing situations. CIB is a global measure that incorporates parent, child, and dyadic affective states and interactive patterns validated for use in dyads with infants 2-36 months of age. The coding consists of 33 items that constitute maternal composites of sensitivity and intrusiveness, infant involvement and withdrawal, dyadic reciprocity, and dyadic negative states. The current study used the maternal sensitivity and

intrusiveness composites. ‘Maternal sensitivity’ consists of the items: ‘Acknowledging’, ‘Imitating’, ‘Elaborating’, ‘Parent Gaze’, ‘Positive Affect’, ‘Vocal Appropriateness’, ‘Appropriate Range of Affect’, ‘Resourcefulness’, ‘Affectionate Touch’, and ‘Parent Supportive Presence’. The item *parent gaze* was excluded from the original sensitivity composite due to lack of correlation with other composite items (all mothers gazed to the infant). The adjusted sensitivity composite showed high internal consistency ($\alpha = .805$). The original ‘intrusiveness’ composite consists of the following single items at four months: ‘Forcing’, ‘Overriding’, ‘Parent Negative Affect/Anger’, ‘Hostility’, and ‘Parent Anxiety’. In our sample, there was none or very limited variability in the items ‘parental negative affect/anger’, ‘hostility’, and ‘parent anxiety’. ‘Forcing’ is considered “common in the interactions of parents and very young infants (2-6 months)” (Feldman, CIB manual, version 4, 1998, p. 7). In our sample ‘forcing’ and ‘overriding behavior’ was not correlated with each other; Pearson’s $r = .027, p = .859$. The original intrusiveness composite thus showed poor internal consistency ($\alpha = .192$). Therefore, the single item *overriding behavior* – the most central item in the intrusiveness composite - was used to measure non-optimal maternal behavior. All interactions were coded blind to maternal psychopathology diagnoses by the first author and a second judge. Both judges had passed the CIB reliability test from Ruth Feldman. Inter-rater reliability calculated using 20 % randomly chosen interactions of mothers with and without psychopathology rated blindly by the first author showed good reliability (ICC (2,1) = .805).

Statistical Analysis

First, assumptions for the use of parametric tests were explored and non-parametric tests were used when appropriate. A series of ANOVAs with planned contrast were conducted to explore the impact of psychopathology on caregiving representations and

maternal behavior. Spearman's rho correlation was used to evaluate associations between antenatal caregiving representations and maternal caregiving behavior. As assumptions were not met for testing a mediation model, we chose to conduct multiple hierarchical regression analysis to explore the predictive validity of psychopathology and antenatal caregiving representations on maternal behavior.

Missing and Dropout Analysis

Missing items in the symptom interviews and the PCEQ were analyzed and handled with mean imputation on subscale level as data were missing at random. Analyses of dropout and missing data indicated no differences between participants with missing data, participants who dropped out during the study and those that remained in the study.

Results

Sample Characteristics

Demographic information and clinical characteristics of the mothers and their infants are presented in Table 1. Socio-demographic factors (Maternal age, education, relationship status, parity, employment status, nationality, infant gender, and infant age at still face procedure) was not related to maternal behavior and therefore not included as confounders in models predicting maternal behavior.

Insert Table 1

Psychopathology and Caregiving

The first analysis examined the effect of psychopathology on antenatal caregiving representations and maternal behavior. Descriptive statistics are reported in Table 2. There were only significant differences between diagnostic groups on heightened caregiving representations, $F(3,60) = 6.04, p = .001$. There were no significant overall effects of psychopathology groups on maternal sensitivity, $F(3,42) = 0.07, p = .98$, or maternal overriding behavior, $F(3,42) = 2.34, p = .09$. However, planned contrast analyses revealed that mothers diagnosed with depression displayed more overriding behavior compared to the non-clinical control group, $p = .04$. While the difference is statistically significant, the relative small group sizes have the implication that the estimate of effect (0.71 difference in averages) has a 95% confidence interval of 0.04 to 1.38. Mothers diagnosed with psychosis and bipolar disorder did not differ in maternal behavior from non-clinical controls.

Insert Table 2

Predictors of Perinatal Maternal Behavior

We then tested the associations between antenatal caregiving representations and maternal behavior (Table 3). As hypothesized, the non-optimal representations of ‘helplessness’ and ‘role reversal’ were associated with less maternal sensitivity and more overriding maternal behavior. Contrary to our expectations, ‘heightened’ caregiving was not associated with maternal behavior.

Insert Table 3

Hierarchical regression analyses exploring the effect of psychopathology and antenatal caregiving representations on maternal sensitivity and overriding behavior respectively are presented in Tables 4 and 5. Antenatal representational ‘role reversal’ was

the only predictor of maternal sensitivity with higher expectations of a role reversed relationship with the infant associated with less sensitivity with a medium effect size (.35). Psychopathology and 'role reversal' was equally good predictors of overriding behavior at 16 weeks both with medium effect sizes (.29 and .33 respectively).

Insert Table 4 & 5

Exploratory post hoc analysis

As antenatal representations of 'role reversal' and 'helplessness' seemed to be most important for later maternal development, it would be important to describe which groups of women are at the highest risk of experiencing difficulties in these domains. We thus decided to conduct post hoc exploratory analysis. Defining high-risk caregiving representations as scores in the upper quartile of helplessness and role reversal (George & Solomon, 2011). we found that women with a psychosis diagnosis (69%), were more likely to report high-risk representations, compared to mothers with bipolar disorder (50%), mothers diagnosed with depression (46%), and non-clinical mothers (14%), $X^2 = 8.57, p = .04$.

Discussion

The present study explored associations between psychopathology, antenatal caregiving representations, and maternal behavior among mothers diagnosed with psychosis, bipolar disorder, and depression compared to non-clinical controls. This is the first study to explore the association between psychopathology and a multi-dimensional measure of non-optimal caregiving representations during pregnancy. The study found that mothers with psychopathology during pregnancy expected more separation difficulties from their children (heightened caregiving) as compared to non-clinical controls. Previous research has also

found increase in over-activated caregiving representations in clinical groups (Vreeswijk, Maas, & van Bakel, 2012). Dayton et al. (2010) found that mothers whose representations of their child were termed ‘affectively over-activated’ during pregnancy (e.g., distorted representations in the WMCI similar to the heightened dimension on the PCEQ) were more hostile in interactions with their one-year old child. Benoit, Parker, and Zeanah (1997) found an association between ‘distorted’ representations and resistant infant attachment. Finally, previous studies have demonstrated an association between ‘heightened’ caregiving representations and parental distress (Brennan, 2012; Røhder et al., 2018), which suggest that this dimension might also be important for maternal well-being and feelings of self-efficacy, which we did not assess in the current study. These findings point to the potential negative effects of antenatal heightened caregiving representations on parental distress, later mother-infant interactions and child attachment. In our study, we did not see a negative effect of ‘heightened’ representations on early caregiving behavior. It might be that maternal separation difficulties are more suitable in the early phases of infant life where proximity between infant and mother are needed but problematic at later ages where separation from the mother becomes an important developmental task of the infant.

Consistent with existing studies of depression and maternal behavior, we found that mothers diagnosed with depression showed more overriding behavior compared to mothers without psychopathology (Lovejoy et al., 2000). Mothers diagnosed with psychosis and bipolar disorder resembled non-clinical mothers in interactions with the infant at 16 weeks. Other studies on mothers with psychosis in remission have reported similar findings. Howard, Thornicroft, Salmon, and Appleby (2004) found that mothers with psychotic disorders admitted to a mother-baby unit did not need social services supervision when discharged. Pawlby et al. (2010) found that mothers with psychotic disorders did not differ

from healthy controls in their ability to respond appropriate to their infant's cues and Snellen, Mack, and Trauer (1999) found that the quality of mother-infant interaction improved when maternal psychotic symptoms declined.

Even though we did not find any statistically significant diagnostic group differences in antenatal representations of 'role reversal' or 'helplessness', our post hoc exploratory analysis showed that women with psychosis histories are more likely than women with other psychiatric diagnosis to experience high levels of representational role reversal and helplessness. This finding suggests that women with psychosis might have more difficulties in the perinatal transformation of their caregiving representations important for later optimal maternal functioning.

Finally, antenatal caregiving representations of role reversal was the only predictor of maternal sensitivity. As hypothesized, maternal diagnosis predicted maternal intrusiveness but the predictive effect increased significantly when antenatal representations of role reversal were added in the model accounting together for 20 % of the variance in maternal overriding behavior at 16 weeks infant age. These results suggest that in addition to the risk of maternal psychopathology for maternal perinatal behavior previously identified in the literature (Lovejoy et al., 2000), antenatal caregiving development may be an equally important psychological domain that should be addressed in research and clinical practice on maternal perinatal health. Attachment and psychodynamic literature (Ammaniti, Tambelli, & Odorisio, 2013; George & Solomon, 2008; Slade et al., 2011) have described that all women need to make a transformational shift to motherhood. The significance of antenatal caregiving representations for maternal behavior is described in perinatal psychology but may not have been given enough consideration in maternal psychopathology research.

Our findings are the first to demonstrate the predictive validity of antenatal caregiving representations for maternal behavior using a questionnaire. Similar results have been found using interview-based measures of caregiving representations (Crawford & Benoit, 2009; Dayton et al., 2010). Crawford and Benoit (2009) found that the presence of disrupted representations of the unborn child (e.g. role/boundary confusion, fearfulness/dissociation/disorientation, intrusiveness/negativity, affective communication errors, and withdrawal) during pregnancy were predictive of atypical maternal behavior (AMBIANCE) at 12 months. Conceptually, Vulliez-Coady, Obsuth, Torreiro-Casal, Ellertsdottir, and Lyons-Ruth (2013) have suggested that role reversal/confusion encompasses the mother's need for emotional support from her child. Similarly, qualitative studies have reported that for some mothers living with psychopathology motherhood holds a special significance, often described as "a new beginning" or as "providing meaning to their lives" (Dolman, Jones, & Howard, 2013), as "an opportunity to *receive* love" or a wish for their children meeting the mothers' unmet emotional needs (Birtwell, Hammond, & Puckering, 2015). These findings suggest that antenatal development of caregiving representations is important for the mother's emotional preparation for motherhood and that representational role reversal is an important focus for antenatal clinical interventions in addition to the monitoring and treatment of psychopathology.

Strengths and Limitations

Whereas most studies on psychopathology and motherhood involve mothers with depression, a strength in this study was the inclusion of a broader range of maternal psychopathology allowing for comparison among different clinical groups. Adding to this, all participants were non-selectively, consecutively identified. Second, participants in our study represent mothers living with SMI in the community. As previous research has relied

mostly on mothers admitted to inpatient psychiatric facilities, our study expands this research by exploring maternal behavior among more well-functioning mothers with SMI living in the community.

Study limitations involve small group sizes leading to lack of power in consistently detecting group differences. During the recruitment period, we were able to identify more than 400 potential participants, but only 224 of these were referred to the WARM team. Of these, 70 consented to participate in the study (see Figure 1). It is possible that a selection bias from both referring staff and women themselves affected the final sample. Women in our sample did on average not suffer from acute, severe episodes of psychopathology and the sample might reflect perinatal caregiving among better functioning mothers with SMI-histories. This of course limits the generalizability of our results to the greater community of women with SMI-histories.

Finally, the PCEQ is a new instrument with previous studies reporting on postnatal assessments (Røhder et al., in press). The usefulness of the PCEQ for antenatal screening will need to be explored in large community-based samples that could identify norms and cut-offs for non-optimal caregiving representations.

Conclusion

This study explored the impact of psychopathology on antenatal caregiving representations and perinatal maternal behavior among women diagnosed with lifetime psychosis, bipolar disorder, depression, and non-clinical controls. We found that antenatal caregiving representations of ‘role reversal’ predict lower sensitivity and together with a history of psychopathology more overriding-intrusive maternal behavior at 16 weeks. Mothers diagnosed with psychosis exhibited the highest representational risk during pregnancy. We suggest that lifetime psychopathology places mothers at increased risk of

difficulty in the perinatal transformation process needed to establish a self-representation as the stronger and wiser, protective parental figure in the mother-child relationship. Finally, our results provide preliminary evidence for the screening potential of assessing antenatal representational risk in all mothers using a brief questionnaire.

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Table 1

Maternal and infant characteristics

	Psychosis	Bipolar disorder	Depression	Non-clinical control	
	<i>n</i> = 13 (20.0 %)	<i>n</i> = 12 (18.5 %)	<i>n</i> = 26 (40.0 %)	<i>n</i> = 14 (21.5%)	
Maternal characteristics	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>p</i>
Maternal age (years)	29.1 (5.6)	32.0 (5.7)	29.3 (4.2)	30.7 (3.5)	.33 ^a
GAF, symptomatic functioning during pregnancy	64.3 (14.7)	73.2 (11.6)	66.4 (11.7)	90.71 (5.5)	< .000 ^a
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	
Primiparous	8 (61.5)	6 (50.0)	18 (69.2)	11 (78.6)	.46 ^b
Living with a partner	9 (69.2)	12 (100)	20 (76.9)	12 (85.7)	.52 ^b
Education, completed ISCED level 5 or higher of tertiary education	2 (15.4)	6 (50)	16 (61.5)	13 (92.9)	.001 ^b
Employment	1 (7.7)	6 (50)	13 (50.0)	11 (78.6)	.003 ^b
Danish participants	10 (76.9)	10 (83.3)	13 (50.0)	14 (100)	.005 ^b
DSM-V diagnosis of Schizophrenia, Bipolar I Disorder, or Recurrent Depression	8 (61.5)	8 (66.7)	22 (84.6)		
Infant characteristics	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	
Infant age (weeks)	18.1 (3.0)	18.6 (2.8)	17.9 (2.6)	18.7 (3.6)	.87 ^a
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	
Infant gender (girls)	4 (44.4)	8 (66.7)	11 (57.9)	10 (83.3)	.29 ^b

Note. GAF = the Global Assessment of Functioning. ISCED = International Standard Classification of Education, 1997. DSM-V = Diagnosis and Statistical Manual of Mental Disorders (5th ed.).

^a ANOVA; ^b X².

Sample size at 16 weeks: Psychosis *n* = 8 (17.4%); Bipolar disorder *n* = 10 (21.7%); Depression *n* = 17 (37.0%), and non-clinical controls *n* = 11 (23.9%).

Table 2

Group differences in maternal representations and behavior

Variables	Psychosis	Bipolar disorder	Depression	Non-clinical control	Cohens' <i>f</i>
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	
Representations					
Enjoyment	4.66 (.27)	4.58 (.36)	4.54 (.34)	4.50 (.25)	.05
Heightened	3.35(1.04)***	2.83 (.85)*	3.14 (.81)***	2.14 (.49)	.43
Helplessness	2.11 (.42) ⁺	2.14 (.60) ⁺	2.08 (.68) ⁺	1.71 (.44)	.16
Role Reversal	3.56 (1.07) ⁺	3.08 (.88)	3.39 (.62)	2.98 (.69)	.22
Maternal Behavior					
Sensitivity	3.40 (.49)	3.35 (.47)	3.32 (.47)	3.38 (.45)	.03
Overriding	1.81 (.65)	1.89 (.96)	2.53 (.83) *	1.82 (.96)	.33

Note. *M* = Mean; *SD* = Standard deviation.

⁺*p* ≤ .10, **p* < .05; ***p* < .01; ****p* < .001; all *p*-values are two-tailed and indicate differences from non-clinical controls.

Table 3

Correlations between antenatal caregiving representations and perinatal maternal behavior: Spearman's rho

	Maternal sensitivity	Maternal intrusiveness
Enjoyment	.11	-.21
Heightened	-.20	.15
Helplessness	-.23	.31*
Role Reversal	-.27 ⁺	.33*

Note. ⁺ $p \leq .10$ * $p < .05$; all p -values are two-tailed.

Table 4

Linear Model of Predictors of Maternal Sensitive Behavior At 16 Weeks Infant Age, with 95% bias corrected and accelerated confidence intervals reported in brackets. Confidence Intervals and Standard Errors based on 1000 Bootstrap samples

Variable	Model 1			Model 2			Model 3		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Maternal	-0.03			-0.01			-0.01		
Diagnosis	[-15;.08]	.06	.07	[-.12;.08]	.05	-.04	[-.11;.09]	.06	-.02
Role				-.20			-.20		
Reversal				[-.39;-.02]	.08	-.35*	[-.38;-.01]	.09	-.34*
Helplessness							-.09		
							[-.37;.11]	.12	-.11
<i>R</i> ²		.01			.13 ^t			.14	
<i>F</i> for change in <i>R</i> ²					5.83*			.50	

Note. **p* < .05. ** *p* < .01 ^t < .10. *p*-values are two-tailed.

Table 5

Linear Model of Predictors of Maternal Overriding Behavior At 16 Weeks Infant Age, with 95% bias corrected and accelerated confidence intervals reported in brackets. Confidence Intervals and Standard Errors based on 1000 Bootstrap samples

Variable	Model 1			Model 2			Model 3		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Maternal	.23			.21			.18		
Diagnosis	[.01;.43]	.11	.32*	[-.02;.41]	.10	.29*	[-.03;.39]	.10	.25 ^t
Role				.36			.33		
Reversal				[.04;.69]	.16	.32*	[-.01;.67]	.15	.29*
Helplessness							.37		
							[-.17;.85]	.22	.23 ^t
<i>R</i> ²		.10*			.20**			.26**	
<i>F</i> for change					5.32*			2.87 ^t	
in <i>R</i> ²									

Note. * $p < .05$. ** $p < .01$ ^t $< .10$. *p*-values are two-tailed.

Figure 1

Flow chart of recruitment and dropout at 16 weeks

